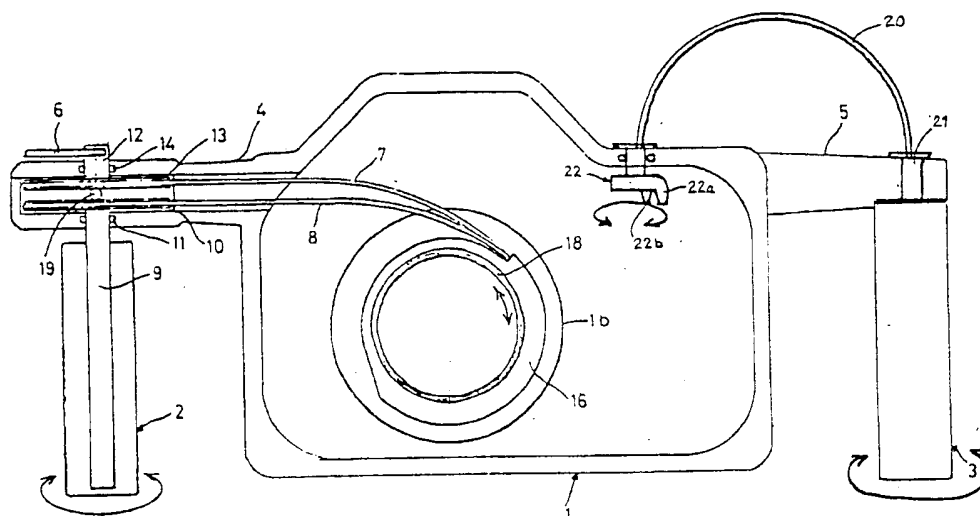


## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: UNDERWATER CASING FOR CAMERAS



## (57) Abstract

An underwater casing for cameras comprising a water-tight housing and means arranged thereon for manoeuvring of the adjustment mechanisms of the camera. The underwater casing comprises two handles (2, 3), which are attached to the water-tight housing (1) by means of connecting pieces (4, 5), which extend out from the housing so that the handles (2) are spaced apart from the housing on both sides thereof, at least certain of said control means (6, 9) being arranged in connection with one or both of the handles (2, 3), so that the user can actuate the control means (6, 9) without releasing the grip of the handles (2, 3). At least one of the handles is rotatable and of the "gas control lever" type and is via a wire (8, 20) coupled to an adjustment mechanism of the camera, so that rotation of the handle (2, 3) effects manoeuvring of said mechanism.

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## Underwater casing for cameras.

The present invention relates to an underwater casing for cameras which makes submarine photography possible with standard cameras of different manufactures by means of one and the same underwater casing.

5 For photography under water special underwater cameras can be used. Such cameras are, however, very expensive, and usually a conventional camera is placed in a water-tight, so-called underwater casing. Maneuvering of the camera, i.e. focusing, diaphragm adjustment, etc., is effected with the aid of control means placed on the outside of the underwater casing. Said  
10 control means are via water-tight lead-throughs connected to devices on the inside of the casing giving the desired actuation of the respective adjustment mechanisms of the camera. Many problems arise due to the fact that different cameras have a different design and location of these mechanisms, and therefore it is difficult to provide an underwater casing which fits several  
15 different types of cameras. Other problems of the commercially available underwater casings are that the control means on the outside of the casing are arranged in close connection to the corresponding mechanisms of the camera, which i.a. makes it necessary to change the grip of the underwater casing in order to change, for example, the focusing. This in turn causes problems during  
20 the photography of, for example, fish and other animals, since the necessary grip change for the control involves movements scaring the animals.

The object of the invention is to eliminate or reduce these and other problems, and for this purpose there is suggested an underwater casing for cameras having the characteristic features indicated in the subsequent  
25 claims.

A particular embodiment of the underwater casing according to the invention will now be described with reference to the accompanying drawings, wherein

Figure 1 is a schematic rear view, with certain parts left out and some details in section, of an embodiment of the underwater casing according to the invention,  
30

Figure 2 is a schematic top plan view, with some parts removed, of the underwater casing shown in Fig. 1, and

Figure 3 is a rear view corresponding to Fig. 1 and illustrating an alternative embodiment of the underwater casing.  
35

The underwater casing shown comprises a water-tight and pressure resistant housing 1. Said housing 1 is provided with a removable back 1a, so that the camera can be inserted into the housing. The back 1a, which



preferably is made of a transparent material, is attached to the rest of the housing by means of suitable attachment and sealing means, e.g. screws and rubber gaskets. The housing is further provided with an annular, preferably slightly conical projection 1b defining a chamber for receiving the lens of the camera. Said projection 1b is at its front closed by a front piece 1c of a transparent material which, of course, has a sufficiently good quality to permit photography.

The housing 1 is when used held by two handles 2 and 3 connected to the housing 1 through connecting pieces 4 and 5. The handles 2 and 3 are on either side of the housing 1, as viewed in the photography direction, and are spaced apart from the housing 1, so that the user can conveniently hold the underwater casing.

According to a characterizing feature of the invention at least one of the handles 2 and 3 is completely or partly rotatable, i.e. of the "gas control lever" type (as indicated by the arrows in connection with the handle 2 in Fig. 1 and the handles 2 and 3 in Fig. 3). In a manner explained further below the rotary motion of the handle(s) is transmitted for actuation of a suitable adjustment mechanism of the camera. In this way the user can with a small movement, which does not scare live picture motives, quickly and easily make the desired adjustment.

In association with the handle 2 the underwater casing shown also has a second control 6, which is mounted on the connecting piece 4 in connection with the handle 2. The control 6 has the form of a lever being placed so that the user can manipulate the same with his thumb without releasing the grip of the handle 2. Also in this case the maneuvering can be effected with a minimal movement.

In the case shown the intention is that the maneuvering of the handle 2 shall actuate the focusing control of the camera, while the control 6 is intended to actuate the aperture adjustment mechanism of the camera. This is often the most suitable design of the control means, but there is, of course, nothing that prevents the control means 2 and 6 shown from being used for actuating other mechanisms of the camera. It is naturally also possible within the scope of the invention to design the handle 3 and the connecting piece 5 in a corresponding way for controlling other mechanisms of the camera such as the shutter-release, time exposure control, film advance lever (when necessary), etc., an example of such an embodiment being shown in Fig. 3.

In the embodiment shown in Figs. 1 and 2 the transmission of



power between the control handles 2 and 6 and the adjustment mechanisms of the camera is effected by means of wires 7 and 8 respectively. To this end the handle 2 is connected to a central shaft 9, which at one end is rigidly secured to a rotary disc 10 placed within the connecting piece 4. An O-ring gasket 11 ensures sealing at the lead-through. The lever 6 is correspondingly coupled to a shaft 12, which in turn is rigidly secured to a second rotary disc 13 in the connecting piece 4. A second O-ring gasket 14 provides sealing at the lead-through. The rotary discs 10 and 13 are thus rotatably journaled in the connecting piece 4, and the wires 7 and 8 are fixed to the respective rotary disc (at 15 in Fig. 2). As best appears from Fig. 2 the wires run in corresponding grooves along the periphery of the rotary discs, and they run through the connecting piece 4 (which is sealingly attached to the housing 1) into the interior of the housing 1. In the embodiment shown the opposed ends of the wires 7, 8 are each connected to a ring 16 and 17 respectively, which are arranged to be placed over the focusing ring and diaphragm adjustment ring respectively. The inside of the ring may advantageously be completely or partly covered with an elastic rubber or plastic moulding or strip 18 for improving the engagement with the lens. By providing the rings 16, 17 with mouldings 18 of different thickness, the inner diameters of the rings can easily be adapted to the lens of the camera in question. Alternatively, for each underwater casing special rings corresponding to the most frequent camera types can be made. According to an alternative embodiment two or more rings, one mounted inside the other may be used instead of each of the shown rings 16 and 17. For example, it is possible to use non-rotary outer rings, which are supported by the housing 1 and wherein one or more inner rings, corresponding to the rings 16 and 17 are rotatably mounted, if a more extensive control of the camera lens in relation to the housing 1 is desired.

An essential advantage of using wires 7, 8 as power transmission means according to the invention is that they permit a great flexibility as regards the connection to the adjustment mechanisms of the camera. The wires may thus be arranged quite loosely inside the housing 1 (with the exception of the necessary securing of the wire sleeves, which may be effected at an arbitrary suitable place). This is of particular importance due to the fact that the location and mutual distance between e.g. the diaphragm adjustment and focusing-controls vary significantly between different cameras. Thus, the underwater casing according to the invention is practically independent of the distance between the diaphragm adjustment ring and the



focusing ring of the lens, since the free wire ends automatically adjust themselves to this distance. If, as in the above indicated alternative embodiment, guide rings supported by the housing 1 are used, said distance is adjusted by making the rings supported by the housing 1 displaceable in the photography direction, for example by having the latter slidable along pins (not shown) or the like, which suitably are provided with means for securing in arbitrary positions.

In Fig. 1 a design of the control means 6, 9 is shown, which is particularly suitable for photography at great depths, where the pressure difference between the surrounding water and the interior of the housing 1 is great and can lead to maneuvering difficulties due to the fact that the control means by the pressure are pressed against each other and/or against the connecting piece. To this end an axial bearing of the low friction type, e.g. a ball bearing 19, is arranged between the rotary discs 10, 13, whereby i.a. a balancing of the pressure on the control means 2 and 6 is achieved.

In the embodiment shown in Fig. 3 the handle 2 is provided with the same kind of control means 2 and 6 as in Fig. 1 for focusing and diaphragm adjustment. In this embodiment also the second handle 3 is rotatable in relation to the connecting piece 5, and it is via a rotary wire or flexible shaft 20 coupled to the housing 1 to permit maneuvering of another function of the camera, suitably the film advance, by rotation of the handle. For this purpose one end of the wire 20 is connected to the central axle of rotation 21 of the handle 3, while its other end is connected to a control element 22 rotatably arranged in the housing, so that rotation of the handle 3 causes rotation of the control element 22. The latter, which may be exchangeable to fit various types of cameras, is preferably provided with two downwardly projecting portions 22a and 22b, which are arranged to - viewed in the direction of rotation - straddle an adjustment button, arm, or the like on the camera and thereby permit active driving of said button, arm, etc. in both directions, dependent on the direction in which the handle 3 is turned. The leadthrough of the wire 20 or the control element 22 through the housing 1 should of course be water-tight, and it may be designed in conventional manner, suitably with the use of one or more O-ring gaskets 24.

The invention is, of course, not restricted to the above described and in the drawings specifically shown embodiments, but many modifications and variations are possible within the scope of the general inventive idea.



CLAIMS

1. An underwater casing for cameras comprising a water-tight housing and means arranged thereon for maneuvering of the adjustment mechanisms of the camera,
- 5 characterized in that it comprises two handles (2, 3), which are attached to the water-tight housing (1) by means of connecting pieces (4, 5) extending from the housing so that the handles (2, 3) are spaced apart from the housing on both sides thereof, at least some of said control means (6, 9) being arranged in connection with one or both of the handles (2, 3) so that the user can actuate
- 10 the control means (6, 9) without releasing the grip of the handles (2, 3).
2. An underwater casing according to claim 1, characterized in that at least one of the handles (2) is rotatable and arranged to actuate one of the adjustment mechanisms of the camera on rotation, preferably the focusing adjustment of the camera.
- 15 3. An underwater casing according to claim 1 or 2, characterized in that at least one rotatable control means (6) is arranged on at least one of said connecting pieces (4) in connection with the respective handle (2), so that the user can actuate the control means (6) with his thumb without releasing the grip of the handle.
- 20 4. An underwater casing according to claim 2 or 3, characterized in that the transmission of power between said rotatable control means (2, 6) and the corresponding camera adjustment mechanism is effected by means of wires (4, 8) attached to the respective adjustment mechanism.
5. An underwater casing according to claim 4,
- 25 characterized in that each wire (7, 8) is attached to a ring (16, 17), which is removably attachable on the respective camera adjustment mechanism.
6. An underwater casing according to claim 4, characterized in that each wire (7, 8) is attached to a ring supported by the housing (1) and rotatably mounted in relation thereto, in which ring a ring
- 30 attachable on the respective camera adjustment mechanism can be inserted, said two rings being provided with engagement means, by which the rotary motion of the outer ring is transmitted to the inner ring.
7. An underwater casing according to claim 6, characterized in that said outer rings are displaceable in relation to each
- 35 other.
8. An underwater casing according to any one of claims 4 to 7, characterized in that each wire (7, 8) is coupled to the respective control



means (2, 6) via a rotary disc (10, 13) connected to the control means.

9. An underwater casing according to claim 8, characterized in that said rotary discs (11, 14) are in contact with each other via an intermediate axial bearing (19).

5 10. An underwater casing according to any one of claims 1 to 9, characterized in that one (3) of the handles is rotatable in relation to the corresponding connecting piece (5), and connected to a rotary wire (20), which in turn is connected to a control element (22) rotatably arranged in the housing (1), said control element (22) being arranged to cooperate with an adjustment  
10 mechanism, especially a film advancing mechanism, of the camera, so that turning of the handle (3) causes a corresponding rotation of said adjustment mechanism of the camera.



Fig. 1

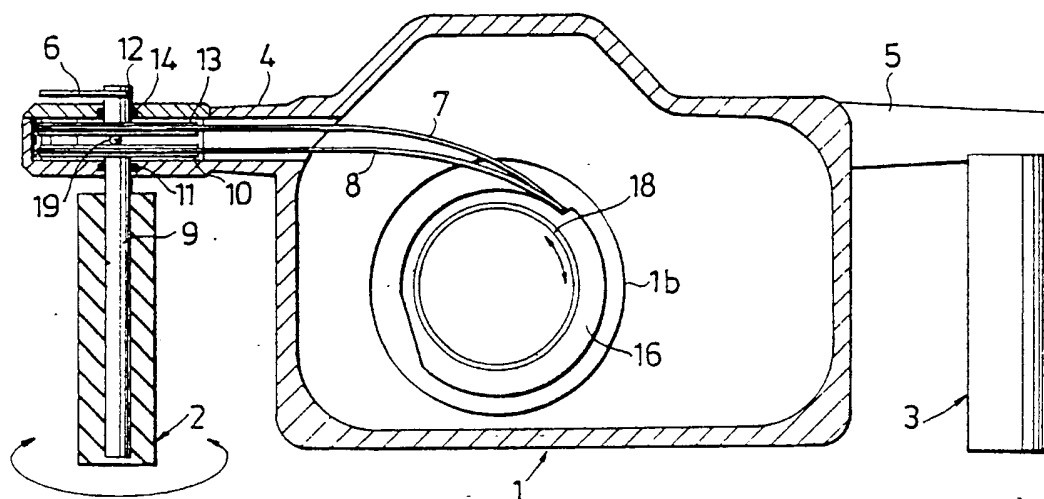


Fig. 2

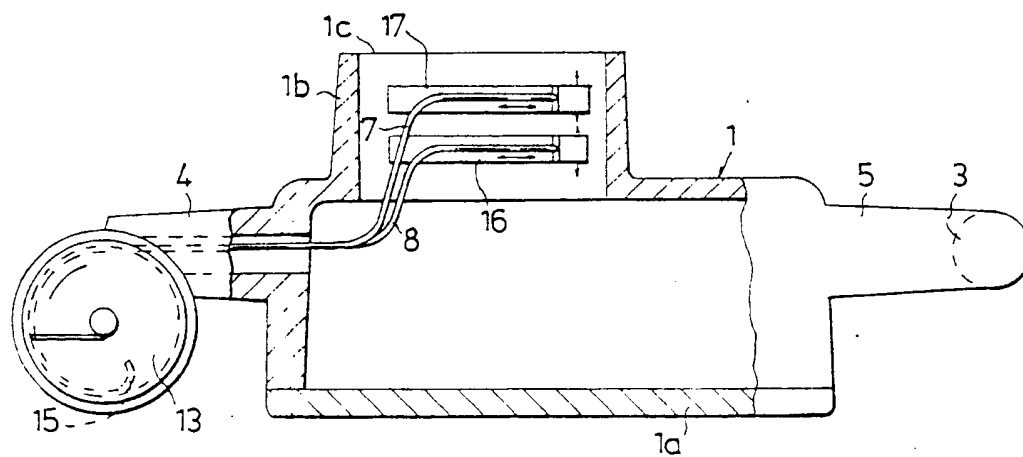
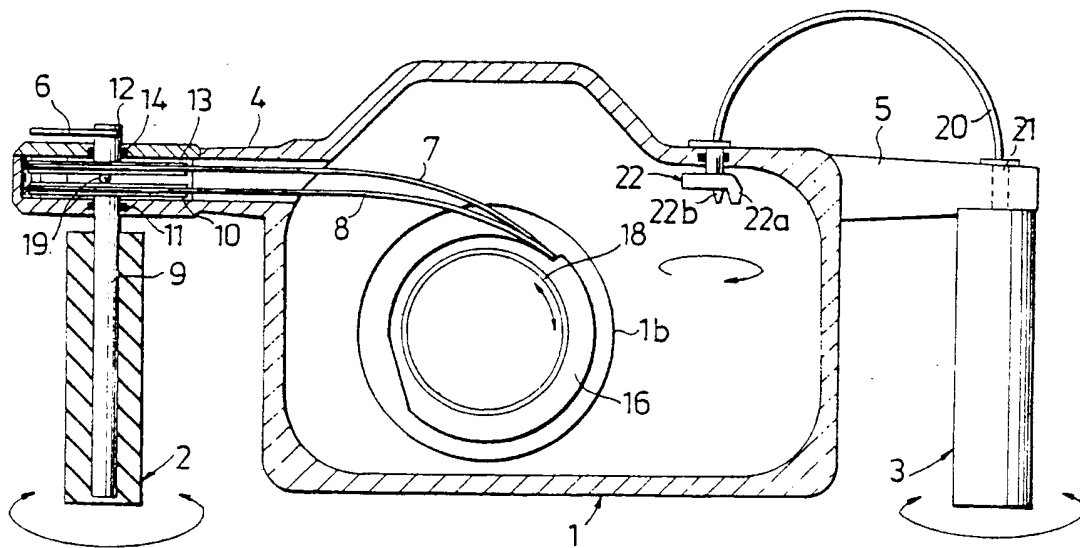
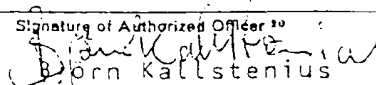


Fig. 3



# INTERNATIONAL SEARCH REPORT

International Application No PCT/SE79/00198

|   |  |                                     |   |  |
|---|--|-------------------------------------|---|--|
| <b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) <sup>1</sup>   |  |                                     |   |  |
| According to International Patent Classification (IPC) or to both National Classification and IPC   |  |                                     |   |  |
| G 03 B 17/08  |  |                                     |   |  |
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| Deutsche kl   | 57 a: 7/01   |                                     |   |  |
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| SE, NO, DK, FI classes as above   |  |                                     |   |  |
| <b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <sup>14</sup>   |  |                                     |   |  |
| Category <sup>6</sup>   | Citation of Document, <sup>16</sup> with indication, where appropriate, of the relevant passages <sup>17</sup>   | Relevant to Claim No. <sup>18</sup> |   |  |
| X   | US, A, 3 065 666 published 1962, November 27,<br>handles 35,36 lever 38 and trigger 39,<br>H F Sampson   | 1                                   |   |  |
| X   | US, A, 3 412 661 published 1968, November 26,<br>handles 26 and lever 60<br>C F Soumar   | 1                                   |   |  |
| X   | DE,A1 ,2 001 287 published 1971, July 22,<br>claim 2,<br>Eckhard Herfert   | 4,5,6                               |   |  |
| X   | DE,A1, 2 446 000 published 1976, April 1,<br>rotatable knob 38 on the handle 36<br>transmits its movement via a flexible<br>cable 22 to the focusing ring 18 of<br>the camera lens 16,<br>Hans Fabian  | 2,3,4,5,6,<br>8,10                  |   |  |
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| Date of the Actual Completion of the International Search <sup>1</sup>  | Date of Mailing of this International Search Report <sup>1</sup>   |                                     |   |  |
| 1979-12-04  | 1979-12-11   |                                     |   |  |
| International Searching Authority <sup>1</sup>  | Signature of Authorized Officer <sup>20</sup>  |                                     |   |  |
| Swedish Patent Office   | <br>Björn Kallstenius  |                                     |   |  |